some of the changes involved may be announced in the course of this summer, and may become operative in the summer of 1912.

IN the issue of *Science* for March 3, Prof. Rudolf Tombo, jun., analyses the registration returns for November 1, 1910, of twenty-seven of the leading universities in the United States. Four of the universities show a decrease in their total enrolment of students, viz. Harvard, Iowa, Indiana, and Virginia, as against four in 1909, two in 1908, and five in 1907. If the returns of the number of students for 1910 be compared with those of 1909, we note that Chicago and Michigan have passed Harvard, that Pennsylvania has changed places with Cornell, that Illinois has been passed by Minnesota, California, and Wisconsin, that North-western has passed Yale, and that Johns Hopkins and Virginia have changed places. For the first time in the annals of American universities the 7000 mark has been passed, Columbia having a grand total of 7411 students. Pennsylvania is the sixth university in the States to pass the 5000 mark; Cornell passed it in 1909, Chicago and Michigan in 1908, Columbia in 1907, and Harvard somewhat earlier. The number of students of science in American universities is decidedly smaller than in 1909, and more than half these institutions showed a loss of students in these departments as compared with the previous year. The chief gains were made by Illinois, Yale, and Columbia in the order given. Cornell, Michigan, Illinois, and Yale each enrolled more than a thousand students of engineering. It is noteworthy that the number of undergraduate women students shows a decrease at the majority of the institutions. All the schools of agriculture continue to show an increase in the number of students, and that in connection with the University of Minnesota is still at the head of the list.

SIR ALFRED KEOGH, rector of the Imperial College of Science and Technology, distributed the prizes and certificates to the students of the South-Western Polytechnic Institute, Chelsea, on March 10. In the course of his address he pointed out the deplorable lack of system which exists in the methods of technological education in London. He advocated the creation of a central institution of university rank to which the other institutions might send their most promising students. He also suggested the formation of technological boards of studies composed of the various teachers of technology in London. The annual report of the institute stated that the progress of the work is satisfactory, particularly in the higher branches of science. During the last session twenty-four students attained the London B.Sc. degree, of whom fourteen graduated in honours. Two old evening students obtained the D.Sc. degree. In the Board of Education examinations fourteen obtained honours certificates. A considerable amount of research was completed during the year and contributed to various scientific societies and periodicals. Mr. Hayes Fisher, M.P., chairman of the governing body, alluded sympathetically to the recent loss sustained by the death of Mr. R. C. Antrobus, who for nearly twenty-five years was closely associated with the work of the institute, including ten years' service as chairman of the governing body. Mr. Fisher also stated that they would be shortly in a position to start upon the new buildings, which will furnish accommodation for natural science laboratories and class-rooms, a new physical laboratory, and new and efficient social rooms. After the meeting, the laboratories, workshops, and other rooms were thrown open for inspection. About 1500 visitors availed themselves of this opportunity to inspect the buildings and apparatus.

REPLYING to a deputation from the Trade Union Congress Parliamentary Committee on March 16, Mr. Runciman, President of the Board of Education, dealt with the question of "half-time" pupils in elementary schools. He said the Board of Education has been at work for some time on schemes for linking up continuation classes, and compulsory attendance at continuation classes, with other educational reforms. The Departmental Committee which inquired into the question of "half time" came to the conclusion that the time had arrived for the raising of the half-time age. A Bill will be introduced very shortly into the House of Commons to carry out some of the recommendations of that committee. Continuation-class work ought not, he said, to end at the age of fourteen, but be carried through that period of adolescence in which the boy has lost his habit of learning and has not acquired the proper taste of learning. The Board wishes to keep alive what are called "humanities" as well as technicalities. In trade schools the Board already gives assistance, and it is revising its educational regulation to assist the schools still further. The deputation asked for an inquiry into the question of endowments, but Mr. Runciman, though he has the subject under consideration, said he was unable to promise the appointment of a Royal Commission on the subject. According to *The Times*, the Bill which Mr. Runciman will introduce to deal with half-time attendance will follow the recommendations made by the Inter-Departmental Committee on Partial Exemption from School Attendance, which reported in August, 1909. In reporting against the continuance of the system, the committee recommended that total exemption under the age of thirteen be abolished; that the attendance certificate for total exemption be abolished; that total exemption at the age of thirteen be granted only for the purposes of beneficial or necessary employment; that the ordinary condition for total exemption be due attendance at a continuation class, but that, subject to the approval of the Board of Education, an authority may adopt as an alternative condition the passing of a standard not lower than Standard VI. The committee anticipated that the abolition of partial exemption, coupled with the raising of the minimum age for exemption to thirteen, would necessitate provision being made in the day schools for the instruction of about 22,550 additional whole-time scholars, and would result in an increased cost to the Exchequer to the amount of 22,540*l*.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 16.—Sir Archibald Geikie, K.C.B., president, in the chair.—L. **Doncaster**: Gametogenesis of the gall-fly (*Neuroterus lenticularis*). Part ii. This paper is a continuation of the paper on the same subject published in the Proc. Roy. Soc., B, vol. lxxxii., 1910, p. 88. The previous part dealt with the spermatogenesis and maturation of the eggs of the summer (bisexual) generation. The present part describes the maturation of the eggs in the spring (parthenogenetic) generation. It is found that there are two types of eggs, laid by different females. In one there is a double polar division, by which the somatic number of chromosomes (20) is reduced to 10, and, since the eggs are unfertilised, 10 chromosomes appear in the segmentation divisions. In eggs laid by other females no maturation division occurs; the egg nucleus, after moving to the edge of the egg as if preparing for maturation, sinks in again, and immediately undergoes the first segmentation division. In eggs of this type 20 chromosomes are found in the segmentation spindles, and polar nuclei are absent. Since experiment shows that some females lay only male-producing eggs, others only female-producing, and since male larvæ show the reduced chromosome number (10) in the germ-cells and nervous system, while female larvæ have 20, it is concluded that the parthenogenetic eggs which undergo reduction yield males, those which do not, females.—Sir Thomas R. **Fraser** and Dr. J. A. **Gunn**: The action of the venom of *Echis carinatus*. The minimum lethal dose of Echis venom by subcutaneous injection per kilogram was found to be:—for the frog, 0·009 gram; for the rabbit, 0·0009 gram; for the rat, 0·00075 gram; for the cat, 0·008 gram; and for the pigeon, 0·004 gram. The frog and the cat, therefore, show a relatively high resistance to this venom, the minimum lethal dose for these animals being about ten times that for the rabbit or rat. In the case of Sepedon venom, which may be taken as a typical Colubrine venom, a different ratio of lethality has been found by us for those animals, the cat showing a relatively even higher resistance, but the frog no increased resistance, as compared with the rabbit or rat. This of itself points to an intrinsic difference between the actions of Viperine and Colubrine venoms. The chief effects produced by Echis venom in the animals investigated are hæmorrhages occurring locally and distally, alterations in the coagulability of the blood, and secondary effects upon the respiration, heart, and central nervous system. The symptoms of experimental poisoning thus very closely resemble those which have been described in cases of Echis bite in man. Echis venom differs from Colubrine venoms in having little or no direct action on the central nervous system or on the nerve terminals in voluntary muscle. It has a direct action in lowering the blood-pressure in mammals by slowing and weakening the heart's contractions; lethal doses also produce a fall of temperature in mammals. The chief toxins in Echis venom, in the order of their potency, are a hæmorrhagin, a substance which alters the coagulability of the blood, and a hæmolysin.—Sir David **Bruce**, Captains A. E. **Hamerton** and H. R. **Bateman**, and Captain F. P. **Mackie** (Sleeping Sickness Commission of the Royal Society, Uganda, 1908–10). Further researches on the development of *Trypanosoma gambiense* in *Glossina palpalis*. (1) In the course of the development of *Trypanosoma gambiense* in *Glossina palpalis*, the proboscis does not become involved, as in the case of some other species. (2) A few days after an infective feed the trypanosomes disappear out of the great majority of the flies, but in a small percentage this initial disappearance is followed by a renewed development. (3) After a very short time the flies which have fed on an infected animal become incapable of conveying the infection by their bites, and this non-infectivity lasts for some twenty-eight days, when a renewed or late infectivity takes place. (4) A fly in which this renewed or late infectivity occurs can remain infective for at least ninety-six days. (5) An invasion of the salivary glands occurs at the same time as this renewal of infectivity, and without this invasion of the salivary glands there can be no infectivity. (6) The type of trypanosome found in the salivary glands when the fly becomes infective is similar to the short, stumpy form found in vertebrate blood, and it is believed that this reversion to the blood type is a *sine qua non* in the infective process.—Dr. M. **Haaland**: Spontaneous cancer in mice. The observations recorded have been made upon 300 mice in which cancer had developed spontaneously. The tumours originally observed numbered 350. Many of the mice presented multiple growths. It is important that forty-two tumours had a structure distinct from that of the well-known mammary tumours of the mouse. Spontaneous healing is recorded of undoubted malignant new growths. The reasons have been sought for that preponderance of mammary tumours which is characteristic for the mouse. The physiological demands made upon the mamma by repeated pregnancy and lactation can be excluded, since many of the mice which had been under observation since birth had never littered, and twenty had been completely isolated from possibility of association with a male. The histological examination of the mamma of a large number of old mice, cancerous and non-cancerous, showed the frequency of chronic inflammation combined with hypertrophic and other changes in the epithelium. The latter pass through all stages to definite tumours. The only explanation found for the chronic inflammatory and other changes was the presence of nematodes. Numerous experiments of diverse kind were made to define the parts played by local causes, such as those described above, and by constitutional conditions. All the evidence points to the importance of local causes, *e.g.* chronic irritation, and to the absence of general constitutional changes favourable for the growth of cancer. The part played by the irritant is a mediate one, so that it produces the altered conditions under which either the first departure of the cells from the normal takes place, or permits spontaneously occurring sports of cells to multiply and adapt themselves to a new mode of life as observed in propagated tumours.

Geological Society, March 8.—Prof. W. W. Watts, president, in the chair.—Contributions to the geology of Cyrenaica, by Prof. J. W. Gregory and others. (1) Prof. J. W. **Gregory**: The geology of Cyrenaica. According to the evidence available in 1908 regarding Cyrenaica, the country might be interpreted as a fragment of a mountain-loop, or as a plateau of Miocene rocks. In a journey across the country, the author found that it was a plateau of Lower Kainozoic limestones. These limestones must have been deposited in a clear sea, at depths down to 1000 fathoms. Intervals of shallow sea are indicated by limestone-conglomerates and coral-reef limestone. The country was uplifted in later Miocene times, and was then part of a wide land which included Crete and occupied the site of the Ægean Sea. This land was broken up by great subsidences, which left Cyrenaica as a horst bounded by fault-scarps on the north and west. Cyrenaica may be regarded as part of the western limb of the geosyncline of western Egypt.—(2) R. B. **Newton**: Notes on the Kainozoic Mollusca. A number of Mollusca are recognised as belonging to members of the Kainozoic system. The most abundant of the post-Pliocene series is *Cerastoderma edule*. Among the Helvetian-Tortonian forms are *Alectryonia* cf. *virleti* and *Strombus* cf. *coronatus*. The Aquitanian shells present a relationship to the "Schioschichten" fauna of northern Italy. Foraminiferal organisms occur in these beds, but no nummulites. *Lepidocyclina elephantina*, a good Aquitanian species, is found with *Oopecten rotundatus* from Birlibah. The most characteristic of the Priabonian Mollusca is *Pecten arcuatus*. A new species of Æquipecten is described. Nummulites abound in these rocks. So far as the Mollusca are concerned, nothing older than Lutetian has been observed.—(3) F. **Chapman**: Foraminifera, Ostracoda, and parasitic fungi from the Kainozoic limestones of Cyrenaica. The Foraminifera are mainly from the Middle Eocene; others belong to the Upper Eocene and to the Aquitanian or Stampian. The most abundant foraminifer is *Nummulites gizehensis*. At a higher horizon is a nummulitic limestone containing *N. gizehensis*, var. *lyelli*. Some limestones at Wadi Umzigga contain *Lepidocyclina elephantina*, and are referred to the Aquitanian or Stampian. The boring fungus *Palaechyla perforans* occurs perforating Lepidocyclina.—(4) Prof. J. W. **Gregory**: The fossil Echinoidea of Cyrenaica. The Echinoidea are referred to ten species, of which two are new, and one is a new variety. The echinoids come from four horizons; the oldest fauna belongs to the Middle Eocene; the Upper Eocene is represented by an unusually early species of Amphiope, and by an Echinolampas. Some echinoids from the Cyrene limestones are of Aquitanian affinities, and others seen in the limestone east of Benghazi are Miocene. The echinoid faunas show that the Eocene rocks containing them were, as a whole, deposited in a sea of moderate depth.—(5) D. P. **MacDonald**: The foraminiferal limestones of Cyrenaica. The microscopic examination of the limestones shows that they are mainly composed of organic material, and are free from detrital material. Some of them have been partly dolomitised. Some of the limestones are oolitic.—G. E. **Dibley**: The teeth of the genus Ptychodus, and their distribution in the English Chalk. This paper is an attempt to define the species of the fossil fish genus Ptychodus. Hitherto, our information as regards Ptychodus has been derived from associated sets of *P. decurrens* in place and isolated teeth of this and other species. The variation in teeth of one individual is often so marked that, when found separately, they have given rise to the formation of new species. It can now be proved that these teeth belong to already known species, and merely represent a phase in variation in the development of certain teeth of one species. Special attention has been given to the extreme variation in *P. decurrens*, as well as in the equally variable species *P. polygyrus*, and one new species has been added.

Zoological Society, March 7.—Dr. A. Smith-Woodward, F.R.S., vice-president, in the chair.—Dr. Karl **Jordan** and the Hon. N. Charles **Rothschild**: Some Siphonaptera from northern China. This collection of fleas had been made by Mr. M. P. Anderson, the Duke of Bedford's collector, in the province of Shen-si, and contained altogether seventeen species, of which no fewer than thirteen were new. Some of these were possibly only geographical developments, but others represented distinct types not very nearly allied to any known species.—F. E. **Beddard**: Certain points in the anatomy of the frog *Megalophrys* (*Leptobrachium*) *feae*, based on specimens exhibited in the society's gardens.—F. E. **Beddard**: The spermatophores in earthworms of the genus Pheretima (=Perichæta). These structures had been found in two species, one of which would be described as new, contained in a collection of terrestrial Oligochæta from the

Philippine Islands, which had been submitted to him for examination by the director of the Scientific Bureau of the Philippines.—R. **Lydekker**: (1) A rare beaked whale; (2) age phases of the rorqual.—Dr. P. Chalmers **Mitchell**: Longevity and relative viability in mammals and birds, with a note on the theory of longevity. The work was based on a study of the records of the duration of life in the society's gardens of more than 20,000 individual mammals and birds. These were arranged systematically so as to make possible a comparison of the average duration with the maximum duration and what was known or could be inferred as to the potential longevity. Such a method gave a measure of the effect of the conditions of captivity on the duration of life. The memoir discussed some of the results obtained by such a comparison, particularly with regard to the provision of artificial heat. In the note on the theory of longevity, the author briefly reviewed the contributions of Ray Lankester, Weismann, and Metchnikoff, and stated his conclusion that potential longevity was due to constitutional causes, that the constitution was adapted to the average specific longevity, and that the correlation between longevity and reproduction was the reverse of what had been suggested by Weismann.

Dublin.

Royal Dublin Society, February 28.—Prof. T. Johnson in the chair.—W. J. **Lyons**: The determination of density, thermal expansion, and volume-change on fusion of waxes. The author described a simple but effective apparatus for the exact determination of the density of liquid and solid fats and waxes at any temperature. The method can be applied to examine the continuous change in volume on change of temperature, and the abnormal volume change on fusion. Some interesting results were shown for beeswax and other waxes.—R. J. **Moss**: A simple form of apparatus for drying substances *in vacuo* at the temperature of boiling water. Finely powdered selenite lost 93·4 per cent. of the total water of crystallisation in one hour by this method, whereas when dried for five hours in the water oven in the ordinary way the loss was only 72·7 per cent.

Paris.

Academy of Sciences, March 13.—M. Armand Gautier in the chair.—H. **Le Chatelier**: The alterability of aluminium. After some months' use, a marked alteration in the surface of some aluminium utensils was noticed. Photomicrographs are reproduced in the paper showing the nature of the change. The metal developed a crystalline structure, and the crystals tended to become isolated from each other. Some laboratory experiments made with a view to imitate this cellular structure, and to obtain a separation of the grains, have shown that aluminium containing small quantities of calcium lends itself more easily to the reproduction of this structure.—Gaston **Bonnier,** Louis **Matruchot,** and Raoul **Combes**: Researches on the determination of microscopic germs in the atmosphere. Previous researches on this subject have been chiefly directed to the determination of bacteria, and very few have considered the question of the fungi. The apparatus used in this work is described in detail, and a preliminary account of the results is given. The work includes the influence of the culture medium on the development of the organisms, the influence of the surrounding vegetation on the dissemination of the germs, and the influence of the altitude. Amongst other results, the presence of numerous colonies of moulds has been proved in a sample of snow taken on the Pic du Midi at an altitude of 2860 metres. As regards the effect of altitude, the fact already known that the proportion of bacteria diminishes rapidly with the altitude has been confirmed, but, so far as the moulds are concerned, this diminution is less marked, as even at high altitudes numerous mould spores are still found.—A. **Chauveau**: The battle of the visual fields in the stereoscope. A continuation of the work described in an earlier communication (February 27). The results are summarised in ten conclusions, too lengthy for reproduction.—Pierre **Termier**: The age of the green rocks of the Belledonne chain. The green rocks at Tabor are not metamorphosed from the Lias nor from the Trias, and are, indeed, much earlier than the latter.—Paul **Sabatier** and A. **Mailhe**: The catalytic splitting up of esters by certain metallic oxides. Esters may split up catalytically in several directions, forming ketone and carbon dioxide; ethylenic hydrocarbon and water; ketone, carbon dioxide, hydrocarbon and alcohol; acid and hydrocarbon. Examples are given of all these cases, and it is shown that the nature of the acid, the temperature, and the nature of the metallic oxide all have an influence on the course of the reaction.—M. Pavlov was elected a correspondant in the section of medicine and surgery in the place of the late M. Herrgott, and S. Arrhenius a correspondant in the section of physics in the place of the late M. Hittorf.—M. **Nicolau**: The variation in the motion of the moon.—Zoárd **de Geöcze**: Contribution to the quadrature of curved surfaces.—Henri **Villat**: The problem of Dirichlet relating to a circular corona.—Gustave **Dumas**: The resolution of the singularities of surfaces.—C. **Tissot**: The exact determination of the periods of electrical oscillations. A discussion of the limitations of the method described in a previous paper. —C. **Gutton**: A comparison of the velocities of propagation of light and of electromagnetic waves along a wire. The comparison of the velocities of light and electromagnetic waves has hitherto been obtained by the determination of each magnitude separately. By utilising the electrical double refraction of carbon bisulphide, the author makes a direct comparison of the two velocities without measuring either separately. The two velocities were found to be equal within 1 per cent., or within the limits of accuracy of the experimental method employed.—Pierre **Weiss**: Magneton in solid paramagnetic bodies.—Ch. **Moureu** and A. **Lepape**: A spectrophotometric method for the estimation of krypton, especially of the yellow line 5871·12 and the green line 5570·50, and the regular increase in the intensity of the yellow line in a mixture of argon and krypton. This line is in the region of the spectrum in which the eye has a maximum sensitiveness. The results are based on the proportion of krypton in atmospheric argon as found by Sir William Ramsay, but experiments are in progress to make up standard mixtures of pure krypton in pure argon. The minimum amount of krypton that it has been found possible to estimate is about 0·001 cubic millimetre in 4 four cubic centimetres of the krypton-argon mixture.—A. **Lafay**: The utilisation of the acetylene method for the measurement of the velocity of the wind and the study of the aërodynamic field. Comparison of the velocities measured by the vane anemometer and the Pitot tube, respectively, frequently give very discordant results. The method proposed by the author is based on the high refractive index of acetylene. A jet of acetylene is cut off periodically at known intervals of time, and the regularly spaced nebulosities photographed. The results obtained agree better with the indications of the vane anemometer than with those of the Pitot tube.—M. **de Broglie**: The lowering of the differences of the contact potential apparent between metals caused by the removal of the adherent layers of moisture.—M. **Dussaud**: New applications of low voltage bulbs. Some applications of the intense light obtained by tungsten wires in a high vacuum carrying 1 ampere at 15 volts. This lamp, using only 15 watts, may replace for some purposes an arc using 3000 watts.—Maurice **Joly**: Static frequency transformers.—André **Kling**: The influence of catalytic substances in the determination of vapour density. Different results are obtained in a Victor Meyer vapour density tube according to the presence or absence of a layer of calcined sand at the bottom of the tube. The sand in some cases causes a catalytic decomposition of the substance vapourised, and the vapour density is thus found too low. The replacement of the sand by other metallic oxides known to possess catalytic properties has been studied.—M. **Hanriot**: The nature of adhesivity.—Jean **Meunier**: The modification of the mechanism of flame by convergent combustion.—Mlle. E. **Feytis**: The magnetism of some complex salts.—W. Œchsner **de Coninck**: An attempt at the determination of the molecular weight of uranyl. Five determinations are given of the reduction of uranyl chloride, UO_2Cl_2, in hydrogen at a dull heat, the residual UO_2 being weighed.—V. **Auger**: The oxidation of iodine by hydrogen peroxide. In dilute solution and in presence of a trace of chloride, iodine is quantitatively oxidised to iodic acid by hydrogen peroxide. The iodic acid is recovered in a pure state by simple evaporation.—A. G. **Vournasos**: Some definite bismuthides.—E.

Fleurent and Lucien **Lévi**: A method for the exact determination of the ash in the analysis of vegetable and animal materials.—MM. **Taffanel** and **Durr**: The comparative study of combustible dusts from the point of view of their inflammability.—Const. A. **Ktenas**: An acid eruption at the centre of the *massif* of the Cyclades.—L. **Gain**: A new species of Monostroma coming from the South American Antarctic region.—MM. **Doyon**, A. **Morel**, and A. **Policard**: The direct extraction of hepatic antirhombine. The case of the rabbit refractory to the action of the peptone.—L. **Grimbert**: The separation of urobiline with its chromogen.—J. **Wolff** and E. **de Stœcklin**: A new mode of preparation of the catalase of the blood and on its properties.—W. **Nicati**: The capacity

$$VC = 0{\cdot}1(11 - V),$$

inverse decimal function of the visual angle.—J. P. **Bounhiol**: A hydrodynamic theory of the pseudo-migrations of the tunny fish (*Thynnus vulgaris*) in the Mediterranean.—J. **Deprat**: The classification of fusiline limestones in China.

GÖTTINGEN.

Royal Society of Sciences.—The *Nachrichten* (physico-mathematical section), part vi. for 1910, contains the following memoirs communicated to the society:—

May 2.—D. **Hilbert**: Outlines of a general theory of integral equations.

October 29.—O. **Wallach**: Researches from the Göttingen University chemical laboratory, xxiv.: (1) Reduction of unsaturated cyclic alcohols; (2) reduction of unsaturated ketones.

November 26.—W. **Voigt**: Changes in concentration of the solution of a magnetisable salt in a non-homogeneous magnetic field.

December 10.—P. **Furtwangler**: Researches on the last of Fermat's theorems and the division of the circle.—J. **Yoshikawa**: Boundary-value problems with three parameters.—J. **Yoshikawa**: A theorem in oscillations with two parameters.—E. **Hecke**: Real quadratic groups and automorphic functions.

DIARY OF SOCIETIES.

THURSDAY, MARCH 23.

ROYAL SOCIETY, at 4.30.—A Theory of Asymptotic Series: G. N. Watson.—The Ionization of Heavy Gases by X-rays: R. T. Beatty.—The Variation of the Ionization with Velocity for the β-Particles: W. Wilson.—The Causes of Absorption of Oxygen by the Lungs in Man: C. G. Douglas and Dr. J. S. Haldane, F.R.S.—The Influence of Planets on the Formation of Sun-spots: Dr. A. Schuster, F.R.S.

ROYAL INSTITUTION, at 3.—Giants and Pygmies: Prof. A. Keith.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Electricity Meters with Notes on Meter Testing: H. A. Ratcliff and A. E. Moore.

FRIDAY, MARCH 24.

ROYAL INSTITUTION, at 9.—The Sidereal Universe: Sir David Gill, K.C.B., F.R.S.

PHYSICAL SOCIETY, at 5.—(1) A Sensitive Thermo Regulator; (2) Experiments on the Measurement of Electrolytic Resistances using Alternating Currents: Dr. H. F. Haworth.—(1) Oscillatory Currents in Coupled Circuits; (2) Some Radio-telegraphic Apparatus in Use at the City and Guilds (Engineering) College: Prof. G. W. O. Howe.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Uses of Chemistry in Engineering: James Swinburne, F.R.S.

SATURDAY, MARCH 25.

ROYAL INSTITUTION, at 3.—Radiant Energy and Matter: Sir J. J. Thomson, F.R.S.

MONDAY, MARCH 27.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The New Geography: its Aims and Methods: H. J. Mackinder, M.P.

ROYAL SOCIETY OF ARTS, at 8.—Applications of Electric Heating: Prof. J. A. Fleming, F.R.S.

INSTITUTE OF ACTUARIES, at 5.—State Insurance against Invalidity and Old Age—the Actuarial Basis of the Austrian Method: G. W. Richmond.

TUESDAY, MARCH 28.

ROYAL INSTITUTION, at 3.—Explorations of Ancient Desert Sites in Central Asia: Dr. M. A. Stein.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Further discussion*: The Electrification of a Portion of the Suburban System of the London, Brighton and South Coast Railway: P. Dawson.—*Probable Papers*: The Improvement of Highways to meet Modern Conditions of Traffic: J. W. Smith.—Recent Development in Road-traffic, Road-construction and Maintenance: H. P. Maybury.

WEDNESDAY, MARCH 29.

ROYAL SOCIETY OF ARTS, at 8.—Art Education in Jewellery, Goldsmithing, and Allied Trades: G. B. Heming.

BRITISH ASTRONOMICAL ASSOCIATION, at 5.

THURSDAY, MARCH 30.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: The Chemical Dynamics of Serum Reactions: Captain A. G. McKendrick.—Preliminary Note on a Method of Measuring Colour Sensations by Intermittent Light, with Description of an Unfinished Apparatus for the Purpose: Dr. G. J. Burch. F.R.S.—On Variation and Adaptation in Bacteria, illustrated by Observations upon Streptococci; with special reference to the Value of Fermentation Tests as applied to these Organisms: E. W. A. Walker.—On the Inter-relations of Genetic Factors: W. Bateson, F.R.S., and Prof. R. C. Punnett.—A Case of Gametic Coupling in Pisum: P. de Vilmorin and W. Bateson, F.R.S.—On Gametic Coupling and Repulsion in *Primula sinensis*: R. P. Gregory.

ROYAL INSTITUTION, at 3.—Surface Combustion and its Industrial Applications: Prof. W. A. Bone, F.R.S.

FRIDAY, MARCH 31.

ROYAL INSTITUTION, at 9.—Travelling at High Speeds on the Surface of the Earth and above it: Prof. H. S. Hele-Shaw, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Uses of Chemistry in Engineering: J. Swinburne, F.R.S.

SATURDAY, APRIL 1.

ROYAL INSTITUTION, at 3.—Radiant Energy and Matter: Sir J. J. Thomson, F.R.S.

CONTENTS.

PAGE

A Criticism of the Darwinian Theory. By Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S. 103
Movement of Molecules. By E. R. 105
Medical Biology. By A. D. 106
Geological Essays. By G. A. J. C. 106
The Analysis of Synthetical Dyes 107
Domesticated Animals. By R. L. 107
Popular Science 108
Our Book Shelf 108

Letters to the Editor:—

The Flow of Thin Liquid Films. (*Illustrated.*)—**W. G. Royal-Dawson** 110
Water-vapour on Mars.—**Prof. Frank W. Very** . . 110
The Fox and the Fleas.—**Prof. T. McKenny Hughes, F.R.S.** 110
The Circulation of Air in the Southern Hemisphere. By Dr. J. Hann 111
The Institute of Palæontology 112
The Ethnology of Yoruba and Benin. (*Illustrated.*) **By Sir H. H. Johnston, G.C.M.G., K.C.B.** 113
High-frequency Generator for Wireless Telegraphy. By A. J. Makower 114
Reconstruction of the University of London . . . 115
The Fur-seals of Bering Sea 116
Prof. Jakob Maarten van Bemmelen. By W. B. H. 116
Dr. John Attfield, F.R.S. By Prof. Henry G. Greenish 117
Notes 117

Our Astronomical Column:—

The Sydney Observatory 122
The Spectra of Spiral Nebulæ and Globular Star Clusters 123
The Dark Borders of the Martian Snowcaps 123
Double-star Observations 123
The "Anuario" of the Madrid Observatory 123
The National Physical Laboratory during 1910 . 123
Velocity of Earth Movements caused by the Messina Earthquake. By Prof. J. Milne, F.R.S. 125
The Ebro Observatory of Cosmical Physics. By M. 125
Emotion and Morals 125
Greek Lands and their People 126
A Destructive Disease of Potatoes. By E. S. S. . 126
Professors and Practical Men. By Prof. Arthur Smithells, F.R.S. 127
Visual Sensations from the Alternating Magnetic Field 129
A Kinetic Theory of Gravitation. By Charles F. Brush 130
University and Educational Intelligence 132
Societies and Academies 133
Diary of Societies 136